

CLAIMS

What is claimed is:

1. A load cup mechanism configured to load a work piece having a periphery into a processing apparatus and to unload a work piece from the processing apparatus, the load cup mechanism comprising:

a load cup arm configured to pivot about an axis between a load position aligned with the processing apparatus and an off-load position;

a work piece platform coupled to an end of the load cup arm;

a plurality of lift fingers spaced about the work piece platform and configured to support a work piece near the periphery of the work piece; and

a plurality of guide fingers spaced about the work piece platform and configured to center the work piece on the work piece platform.

2. The load cup mechanism of claim 1 further comprising a plurality of guide posts spaced apart about the periphery of the work piece platform and configured to align the work piece platform in the load position to the processing apparatus.

3. The load cup mechanism of claim 1 wherein the work piece platform comprises;

a substantially planar peripheral load ring having an upper surface substantially lying in a peripheral load ring plane; and

the plurality of lift fingers are coupled to the peripheral load ring.

4. The load cup mechanism of claim 3 wherein the plurality of guide fingers are coupled to the peripheral load ring.

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5. The load cup mechanism of claim 3 further comprising a support ring coupled to the end of the load cup arm and configured to support the peripheral load ring.

6. The load cup mechanism of claim 5 wherein the support ring comprises:

- a peripheral support ring coupled to the load cup arm;
- a plurality of radial spokes each coupled at a first end to the peripheral support ring; and
- a hub coupled to a second end of each of the plurality of radial spokes.

7. The load cup mechanism of claim 6 further comprising a plurality of spray nozzles configured to spray a fluid onto a surface of the work piece.

8. The load cup mechanism of claim 7 wherein each of the plurality of spray nozzles is coupled to one of the plurality of spokes and wherein the plurality of spokes are configured as a spray manifold for supplying fluid to the spray nozzles.

9. The load cup mechanism of claim 6 further comprising a plurality of springs positioned between the peripheral support ring and the peripheral load ring.

10 The load cup mechanism of claim 9 wherein the plurality of springs comprise a height adjustment configured to adjust the height of the peripheral load ring and to adjust the peripheral load ring plane relative to the processing apparatus.

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11. The load cup mechanism of claim 1 further comprising a plurality of spray nozzles configured to spray a fluid onto a surface of the work piece.
12. The load cup mechanism of claim 1 further comprising a gravity sensor configured to indicate the presence of a work piece positioned on the plurality of lift fingers.
13. The load cup mechanism of claim 1 wherein the plurality of guide fingers are configured to contact an edge of the work piece as the load cup arm is pivoted from the off-load position to the load position.
14. The load cup mechanism of claim 13 wherein the plurality of guide fingers are configured to pivot to a position out of contact with the work piece when the work piece is loaded into the processing apparatus.

15. A chemical mechanical planarization apparatus comprising:

a centrally located work piece robot;

a plurality of chemical mechanical planarization carrier heads positioned about the centrally located work piece robot;

a plurality of load cup mechanisms, each of the load cup mechanisms positioned adjacent an associated one of the plurality of chemical mechanical planarization carrier heads, each of the load cup mechanisms comprising:

a load cup arm configured to pivot about an axis between a load position at which the load cup mechanism is aligned with its associated chemical mechanical planarization carrier head and an off-load position at which the load cup mechanism is positioned to receive a work piece from the centrally located work piece robot;

a work piece platform coupled to the end of the load cup arm;

a plurality of lift fingers spaced about the work piece platform and configured to support the work piece received from the centrally located work piece robot;

a plurality of guide fingers spaced about the work piece platform and configured to position the work piece on the work piece platform; and

a plurality of guide posts coupled to the work piece platform and configured to align the work piece platform with the associated chemical mechanical planarization carrier head when the load cup arm is pivoted to the load position.

16. A load cup mechanism for a chemical mechanical planarization (CMP) apparatus configured to load an unprocessed semiconductor wafer into the CMP apparatus and to unload a processed semiconductor wafer from the CMP apparatus, the load cup mechanism comprising:

a load cup arm configured to pivot about an axis between a load position at which the unprocessed semiconductor wafer is loaded into the CMP apparatus and an unload position at which the processed semiconductor wafer can be unloaded from the load cup mechanism;

a support platform coupled to the load cup arm and configured to pivot with the load cup arm, the support platform comprising a peripheral support ring, a plurality of radial spokes each coupled at a first end to the peripheral support ring, and a central hub coupled to each of the plurality of radial spokes at a second end;

a substantially planar wafer support ring coupled to the support platform;

a plurality of lift fingers coupled to the wafer support ring and configured to support a semiconductor wafer near its periphery; and

a plurality of guide fingers coupled to the wafer support ring and configured to position the semiconductor wafer relative to the wafer support ring.

17. The load cup mechanism of claim 16 further comprising a plurality of guide posts coupled to the wafer support ring and configured to align the wafer support ring with the CMP apparatus when the load cup arm is pivoted to the load position.

18. The load cup mechanism of claim 16 further comprising a plurality of fluid dispenser nozzles positioned on the support platform and configured to spray a fluid onto a surface of the semiconductor wafer.

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19. The load cup mechanism of claim 18 wherein the plurality of radial spokes are configured as a fluid manifold coupled to the plurality of fluid dispenser nozzles.

20. The load cup mechanism of claim 16 wherein the plurality of guide fingers are each configured to pivot about a guide finger axis when the semiconductor wafer is loaded into the CMP apparatus and the plurality of guide fingers contacts the CMP apparatus.

21. The load cup mechanism of claim 16 further comprising a height adjustment mechanism coupling the substantially planar wafer support ring to the support platform.

22. The load cup mechanism of claim 21 wherein the height adjustment mechanism comprises a plurality of springs coupled to the substantially planar wafer support ring and to the support platform.

23. The load cup mechanism of claim 22 wherein the plurality of springs each comprises an integral threaded stud configured to thread into one of the substantially planar wafer support ring or the support platform to provide a height adjustment to adjust the plane of the substantially planar wafer support ring.

24. A processing apparatus for processing a work piece comprising:  
a processing head configured to process a work piece;  
a load cup mechanism configured to pivot from an off-load position to a load position to load a work piece into the processing head for processing, the load cup mechanism comprising lift fingers to support a work piece by its near peripheral edge and guide fingers to position the work piece on the load cup mechanism.

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25. A chemical mechanical planarization apparatus comprising:

a centrally located work piece robot;

a plurality of chemical mechanical planarization carrier heads positioned about the centrally located work piece robot; and

a plurality of load cup mechanisms, each of the load cup mechanisms positioned adjacent an associated one of the plurality of chemical mechanical planarization carrier heads, each of the load cup mechanisms configured to pivot about an axis between a load position at which the load cup mechanism is aligned with its associated chemical mechanical planarization carrier head and an off-load position at which the load cup mechanism is positioned to receive a work piece from the centrally located work piece robot.